MECHANICS' MAGAZINE,

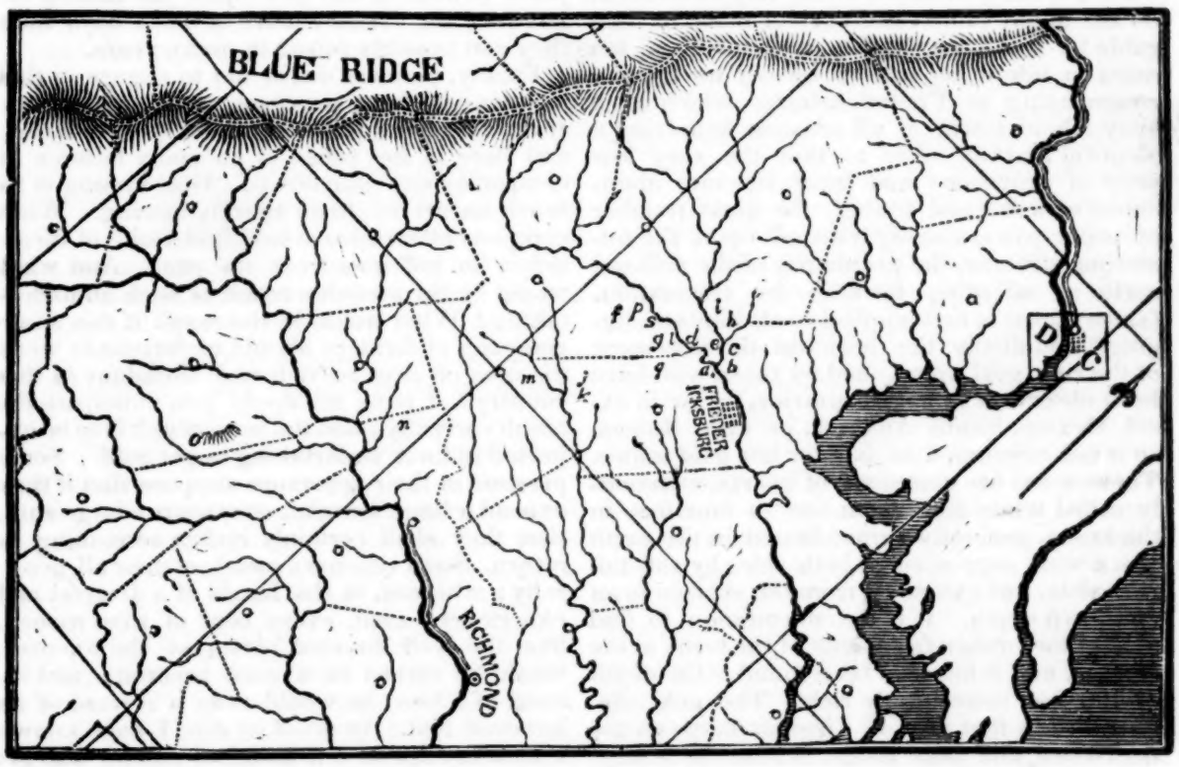
AND

REGISTER OF INVENTIONS AND IMPROVEMENTS.

VOLUME IV.] FOR THE WEEK ENDING JULY 19, 1834. [NUMBER 1.

"The first and last, as well as the most constant lesson, which should be impressed indelibly upon the heart, the conscience, and memory of youth, is, that goodness precedes, and is the only sure foundation of wisdom, and that true wisdom always implies substantial energy, virtue, and freedom"—ADDRESS BEFORE TROY LYCEUM.

THE GOLD REGION OF VIRGINIA.



REFERENCES.

a,	United States Gold Mine,		Spotsylvania	county.
b,	Rappahannock	"	Stafford	"
c,	Rattlesnake	"	do.	"
d,	Culpepper	"	Culpepper	"
e,	Millbank	"	do.	"
f,	Virginia	"	Orange	"
g,	Vaucluse	"	do,	"
h,	Liberty	"	Faquier	"
i,	Union	"	do.	"
j,	Johnson's	"	Spotsylvania	"
k,	Dixon's	"	do.	"
l,	Mellville	"	Orange	"
m,	Tinder's	"	Louisa	"
n,	Goochland	"	Goochland	"
o,	Booker's Willis mt.	"	Buckingham	"
p,	J. Payne's	"	Orange	"
q,	Greenwood	"	Spotsylvania	"

This map exhibits a condensed view of the gold region of Virginia, and is taken from a larger one belonging to Mr. F. Shepherd, of New-Haven, who has spent some months in surveying and exploring this interesting portion of our country. We say interesting, because the amount of gold annually obtained in the United States is estimated in millions of dollars; and this amount is rapidly increasing, when, comparatively speaking, the surface only of the ground has been disturbed in getting this precious metal.

We learn from Mr. S. that the undue excitement which the first discovery of gold creates in the minds of all classes, is now at an end in Virginia, and the business of getting gold is assuming a settled and systematic character. The farmer now goes on with his farming, and the experienced miner with his mining, and in this way each is mutually an aid to the other.

As to the richness of the Virginia ores, Mr. S. has given us full satisfaction, by simply pounding them in a mortar and washing away the sand in our presence, when, to our surprise, a large proportion of metallic gold appeared in numerous and beautiful grains, and this, too, from specimens which had no gold visible on the outside.

The following is an extract from the report of Mr. Shepherd:

"I am decidedly of opinion that Virginia is

destined, sooner or later, to become a rich and prosperous mining country; that whenever skill and capital shall be judiciously applied, (in the language of an able and beautiful writer,) she will one day be to the country what Cornwall is to England, the seat of prodigious industry, and the source of individual and national wealth."

In coming to this conclusion I do not lose sight of the great natural advantages which Virginia possesses over other mining districts in the United States, and throughout the world. It will be seen by the map, that by a little more than half a day's ride, any one can be transported from the city of Washington, on the Potomac, to the gold mines on the Rappahannock, on the banks of a beautiful river made navigable by locks and dams, a distance of ten miles to tide-water and steamboat navigation, commencing at Fredericksburg, which is a busy inland town, at all seasons supplying a plentiful market. Add to this the very low price of provisions and labor, the vast abundance of wood and timber, the great number of water powers easily created upon the numerous streams, the peculiarity of the soil and earth as affording facilities for excavation, (since steam is now applied to all kinds of digging,) and finally the beautiful developement of the rich gold veins, said by those who have been observers in both countries, by far to excel Mexico, South America, or even Russia, so much celebrated of late for her gold mines. These veins are composed of quartz, commonly called white flint, from one to four feet in thickness, generally perpendicular in the earth like a wall, supported on both sides by soft talcose slate, and extending from the surface to an unknown depth. It is not uncommon to find gold in the broken fragments of the veins at the surface, and it has also been found at the depth of 160 feet increasingly rich. The gold district lies in that part of Virginia between the tide-water and Blue Ridge, where the atmosphere is dry and exhilarating, the climate mild and agreeable, the water well tasted and pure, the inhabitants of that class so long and so justly famed for their hospitality and refinement, and for whose convenience, the great National or Southern Railroad is about to pass by them as it were at their thresholds.

Still, with all these natural and extraordinary advantages, I feel it my duty, continues Mr. Shepherd, to give my friends and fellow-citizens of New-England a few words of advice, by way of caution. That there is a very large amount of gold in the great State of Virginia, and that this large amount of gold may be extracted so as to afford a large profit, is clear to a demonstration; and I believe that this section of our country is worthy the attention of northern enterprise and capital. Yet it frequently happens that many persons have an idea that wherever gold is discovered, if they can but get possession of the lands, no matter at what price, their fortune is made for a certainty. This foolish impression has ruined many a man. The temptation is so great, that where a person wishes to sell his land as gold land, and cannot find gold upon it, in order to effect his object, he will sometimes bring gold sands and ores from a distance, and bury them upon his own grounds, which of course the purchaser finds out to his sorrow when too late. Again, some persons, on finding a few grains of gold, suppose that if they dig deep they will surely find the precious metal in masses and blocks. It is needless to add that such visionary day-dreams are rarely realized—still many are sanguine enough to pursue the chance with great ardor.

To those persons who engage in this business for the purpose of speculation, I would say that they will only be benefitted at the expense of others, and will injure the mining interest of the country more in a few days than they can possibly repair in many years.

Finally, persons ought not to engage in this business without previous skill and experience. It is obviously unsafe for them to do so; and here is the cause of so many failures of companies and individuals. Gold mining is as much an art or trade as iron mining. What company of farmers would undertake of themselves to get iron from the ore? And what would be the probable result of such an undertaking? What would be the result if this same company of farmers should undertake to work the ores of zinc, so rich and abundant in this country? I have no doubt you anticipate the result correctly; and the same result is to be expected in their undertaking to get gold. Some persons in their ignorance suppose that if they expend a large amount, or venture a large sum, that they shall certainly realize something in return. Such visionary men lose their all, generally; whereas, in the hands of a discreet and experienced man, every cent of that money, like the well directed blows of the axeman, would be turned to a good account; and instead of a loss, he would reap a reward of an hundred fold. In proof of this, I have known a man to expend ten hundred dollars and get ten thousand dollars of gold for his reward, and from an examination of his lands, believe that he might labor all his life in the same prudent way, and with the same good success. Again, I have known another man, in the same situation precisely, expend the same sum and get nothing but a load of debt upon his shoulders instead of gold. Now will you say that these mines ought not to be worked? No, you will say let them be worked by honest, experienced, and prudent men. Let this be done, and the capitalist will find his money profitably employed, and the millions of gold in Virginia will be made to circulate and gladden the hearts of millions of the human race now pining in want and "perishing for lack of knowledge."

LIGHT.—Dr. Nieuwentyt has computed that, in a second, there flows 418,660,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000 particles of light out of a burning candle, which number contains, at least, 6,337,342,000,000 times the number of grains of sand in the whole earth, supposing every cubic inch of the earth to contain a million of grains.

On Enamelling Hollow Ware. By S. F.

To the Editor of the Mechanics' Magazine, and Register of Inventions, &c.

Sir,—I know not to what cause it may be owing, that one of the most important and valuable improvements in the useful arts has not yet found a place in your Mechanics' Magazine and Register of Inventions and Improvements, but such is certainly the fact. The art of lining cast iron hollow ware with a coat of *enamel* or *porcelain* is certainly, in point of importance to mankind, and the credit due to its inventors, not surpassed, and cannot be surpassed, by any invention which has been or can be produced in the last, the present, or any other century.

Great credit has been given, and perhaps justly, to the inventors of spinning and weaving by mechanical power, thereby contributing to the clothing mankind, at the same time, with elegance and cheapness. But it has been objected, at least with plausibility, that these inventions serve to favor monopolies, and that they deprive the poor of labor. Great improvements have been made in the rapidity and cheapness of travelling, and transportation of goods; and to these also the world has been equally lavish in its applause.

But the advantages of wholesome food are paramount in importance to either elegant or cheap clothing, or to travelling and transportation of goods; and when we duly consider the seemingly unavoidable evils which the human family has suffered since time immemorial, from cooking vessels composed of poisonous metals, constantly subject to corrosion or oxidation—the thousands of lives absolutely cut off, and the millions imperceptibly, but evidently shortened, by slow poison—who, that duly considers the subject, can hesitate to pronounce the invention of Messrs. M. H. Webster & Co., now in successful operation in Albany, one of the most useful and most needed improvements ever made by man: since it furnishes, at a reasonable price, every vessel constituting an entire culinary apparatus, embracing all the firmness and durability of iron without, and all the neatness, beauty, and indestructibility of a China vessel within—deprived of its brittleness, and capable of enduring any heat of a common fire without injury.

Heretofore, copper vessels lined with tin have held the preference; but the tin was soon worn out or melted off, and every time they were used presented the stomach with a small portion of copper in some state or other. If vessels, of what is commonly called tin ware, were used, the tin in like manner soon disappeared, at least in spots, and presented an iron surface. If recourse was had to iron, though perhaps it contained nothing poisonous, it was sure to nauseate and discolor every thing which contained the least portion of acid. Thus we have been constantly subjected to having our food poisoned by copper, blackened by iron, or rendered unpalatable by both. By the invention of Messrs. Webster & Co. all these evils are completely remedied without a single concomitant disadvantage.

It is true, the same has been done before, by an individual in Germany, who, after long and laborious experiments, and vast expense, at length succeeded, not only in attaining his object, but in acquiring immense wealth. But it is said he keeps the knowledge still a secret within his own manufactory; it was, therefore, just as much an original invention with Messrs. W. & Co. as though no one had ever attempted it before.

The character of Dr. Beck, the partner of Mr. W., is too well established as a chemist to need eulogium, or even comment; and Mr. W., his ambitious fellow-laborer in the field of science, though young, has already done enough in conjunction with his partner to merit wealth equal to their wishes, and an imperishable name. The partners, it seemed, were not satisfied with the mere speculative results of chemical investigation—they were not satisfied to hold the light of science to aid others engaged in the useful arts—they wished to bring their light to bear upon new subjects, and show that they could venture with safety upon untrodden ground. They entered upon the subject in question, and pursued it with perseverance which could not be overcome. Their experiments were numerous and expensive, and they found difficulties which no reasoning *a priori* could have foretold. But they have overcome every discouragement.

It is now something more than a year since their business changed from a series of experiments to a regular and promising manufacturing establishment. They began upon a limited scale, as prudence would naturally dictate, intending to enlarge gradually, as the hands they employed should become waywise in the business, and acquire that practical dexterity in the manual operations which alone could establish the credit of their theory. Nothing is now wanting but to make their establishment known to the public, and to make known the advantages which must result from its encouragement. When this even begins to be effected, I should sincerely believe that no person in the United States capable of buying a pot,

a pan, or a tea-kettle, would grudge the little extra expense of such an article as above described over iron or tin; and certainly, if compared with copper, there can be no grudging in the case, as the enamelled ware will be far the cheapest. It is often hinted, that female influence rules the nation; if so, put a small article of this ware into the hands of every good housewife, and give her time to examine it, and the fortune of the manufacturers will be established; for I will pledge my reputation she will never afterwards suffer a hollow cooking vessel of any other kind to come into her house. To conclude, I should presume that no man of sense would refuse, or even hesitate, to introduce the enamelled iron hollow ware into his house in preference to any other, especially to copper, as the copper will not only cost more and be less durable, but will subject him to the certainty of swallowing at least as much copper as will make a tea-kettle in his life-time. S. F.

Large Reflecting Telescopes applicable to Exact Theoretical Astronomy. [From the Repertory of Arts.]

Sir John F. W. Herschel has rendered large reflecting telescopes applicable to the nicer purposes of exact theoretical astronomy. Although the science of astronomy itself does not fall within the plan of the Repertory, yet the construction of astronomical instruments, we conceive, belongs strictly to the department of practical knowledge which it is our purpose to improve and to extend. In accordance with this view of the object of our journal, we now lay before our readers an account of the process by which, in the accomplished hands of Sir John F. W. Herschel, (whose inheritance of his illustrious father's talents embraces alike the ingenuity required for the construction of astronomical instruments, and the accuracy, skill, and profound acquaintance with the subject necessary for their successful employment in the solution of the higher problems of astronomy,) the only obstacle which remained to the application of large reflecting telescopes to the nicer purposes of exact theoretical astronomy has at last ceased to exist.

In the second part of the Philosophical Transactions for the past year is an elaborate paper by Sir John Herschel, consisting of observations of nebulæ and clusters of stars, made at Slough, with a twenty-feet reflector, between the years 1825 and 1833. An appendix explains the manner in which the reduction of the observations, of which the paper itself is a collection, has been executed by the author. It is in the course of this explanation that the final improvement of the reflecting telescope is described. A difficulty presented itself in the reduction of the observed polar distances to mean polar distances at a fixed epoch, arising from considerable fluctuations in the value of a certain expression, which was a function of the times of the transit of the objects observed over the vertical wires of the eye-piece of the telescope. These fluctuations in value, to which the function alluded to was found to be liable in very variable degrees at different epochs of the observations, were occasioned by instability of the instrument, which was partly due to hygrometrical changes, but by far the worst and most intractable part of the fluctuations appeared "to have taken its rise from the shifting of the line of collimation, owing to the mirror taking a new bearing in its cell." "I regret," continues Sir J. Herschel (Phil. Trans., 1833, p. 488), "that I did not earlier perceive this cause of error. It has only recently occurred to me, and the remedy almost at the same instant suggested itself in a simple, and what, I trust, will hereafter prove an effectual application, of the collimation principle of Rittenhouse and Kater. It consists in attaching to the *inside* of the wooden tube of the reflector a small achromatic telescope, having its object glass turned towards the speculum, and its eye end projecting at right angles to the axis of the tube through an aperture in the side, the cone of rays being deflected outwards at a right angle by a small mirror 45° inclined to its axis. In the focus of the object glass (thus rectangularly deflected,) is fixed a cross of fine spider-lines, strongly illuminated by a lamp (capable of being shut off when not wanted,) which also serves to illuminate the field. The cross is so situated, that its image, seen in the telescope as an object infinitely distant, (according to the principle of the collimator,) makes, with all its arms, angles of 45° with the horizontal and vertical wires of the sweeping eye-piece. In the beginning of a sweep, the intersections of both crosses are brought to exact coincidence (by a method presently to be explained); and it is evident that if in the progress of the sweep the slightest shifting of the mirror in its cell should produce a motion of the line of collimation, it cannot fail to be detected by the apparent recess of the two crosses from their original common intersection. A relative motion, to the amount of two seconds of space, either laterally or vertically, cannot possibly escape detection, as I have convinced myself by many trials; and so satisfactory has this mode of overcoming the dif-

ficulty in question proved, that I have no hesitation in saying, that the only obstacle to the use of large reflectors for the nicer purpose of exact theoretical astronomy (viz. the error caused by the shifting of the mirrors in their cells, by reason of their great weight, and the danger of securing them by strong pressure,) has ceased to exist. It is not, however, sufficient to have the means of readily detecting error, without possessing that of correcting it with equal readiness, or at least measuring its amount. A very simple and effectual contrivance accomplishes this. The two adjusting screws by which the mirror case is supported against the bottom of the tube are terminated outside of the latter by large disks or wheels of wood about six inches in diameter, grooved at their edges. Round these re-entering cords are conducted over pulleys, to a convenient point within reach at the mouth of the tube, forming a kind of reins, which hang loose when not in use, but by tightening or drawing one or other of them, any motion, however large or minute, may be given to the line of collimation at pleasure. By the aid of this mechanism, the perfect adjustment of the line of collimation (to the full extent of the optical powers of the instrument) is performed in an instant, and may, if we please, be repeated at every observation, being attended with no trouble; nay, the line of collimation may be purposely deranged to any extent, and immediately corrected. So that by graduating the grooved disks, and adopting an index to each, a very complete distance and position micrometer, for the measurement of double stars, might be formed, in which, if necessary, two lucid points might imitate the two stars to be compared."

To the foregoing account of his application of the collimating principle, Sir J. Herschel annexes the following note:

"My first collimator consisted of a small object glass, by Fraunhofer, of about one inch and a half in diameter, and twelve inches focus. When applied to the twenty-feet reflector, as described in the text, it formed an admirable microscope with its full aperture—an extraordinary proof of the perfection of its construction, this being, doubtless, the severest test to which an achromatic object glass can be possibly subjected. The most beautiful object I can remember to have seen in telescopes was Jupiter entering, perfectly defined, and with all the appearance of a real globe, into the image of a small glass globule, placed in the focus of the collimating telescope. It seemed like the mutual penetration of two solids, or rather two essences of different natures, the one bright and ethereal, the other dark and adamantine. This most exquisite specimen of workmanship was destroyed by an accident. That with which I have been forced, temporarily, to replace it, bears no comparison with the original."

On the Employment of Filters in Chemical Analysis. By Dr. Turner, Professor of Chemistry in the University of London. [From the Repertory of Arts.]

In my own researches I am in the habit of determining the weight of substances collected on a filter in one of three different ways. One of these, introduced by Berzelius, consists in burning the filter in a platinum crucible, and deducting the weight of its ashes. This method is peculiarly applicable to the analysis of minerals where such substances as silica, alumina, and lime, are frequent. Even some substance of easy production, such as peroxide of iron and sulphate of baryta, may be safely treated in the same way; but in these cases it is advisable, not only, as usual, to separate the mass of the precipitate from the filter before setting it on fire, but to moisten both with a little nitric acid, and to insure very free exposure to the air during the burning of the paper and the subsequent ignition. For such purposes I commonly use some excellent Swedish filtering paper, kindly procured for me by Berzelius.

Another method is that of the double filter, introduced by Dr. Thomson, which I have used in all the experiments where filtration is spoken of in the present and former communication. Both Berzelius and Dr. Thomson himself seem inclined to doubt the accuracy of this method; and it is certainly liable to objection, except with certain precautions and with very compact filtering paper. The paper which I use for the double filter is considerably thicker than the Swedish paper, and of such compact texture, that recently precipitated oxalate of lime, or sulphate of baryta, thrown down by Glauber's salt in a neutral solution of the chloride of barium, may be filtered by it. The precautions employed are these: The paper, folded into filters, is macerated in dilute nitric acid for two days, is then fully washed with warm distilled water, and dried at a temperature of 212° Fahr. After acquiring its hygrometic moisture, two of the filters of nearly the same weight are poised against each other, and any small difference marked in pencil on the lighter one. Before being used a pin-hole is made in the outer

filter, in order that any accidental imperfection in the inner filter should be made apparent. After filtration both filters are dried at the same temperature, and are afterwards allowed to recover their hygrometric moisture completely before removal to the balance. In repeated trials I have found a pair of filters to recover, after use, their original relation in weight to within the 100th part of a grain; nor have I ever noticed a greater deviation than may well be expected in every process where filtration is concerned. Additional testimony of the same kind will be found in my Essay printed in the Philosophical Transactions for 1819 [1829], where, in two sets of experiments, the same point is investigated by the use of double filters, and by evaporating the precipitate to dryness without filtration.

A third method consists in employing a single filter, which is dried, before and after filtration, at some fixed temperature, as at 212° Fahr.; and when so dried, is inclosed in a light silver vessel, the cover of which is tightly fitted by grinding. The filter may thus be deliberately weighed without absorbing moisture during the operation. In case of its being inconvenient to employ an uniform temperature, the filter may be dried at a variable heat, be allowed to absorb hygrometric moisture, and afterwards kept at about 50° Fahr. for two hours in a closed bottle, the bottom of which is covered with pulverized quicklime. In this method, while operating at least with paper of English manufacture, it is essential, more so than with the double filter, to have previously macerated the filter in dilute acid; for all such paper which I have examined contains lime.—[Phil. Trans., 1833, Part ii. p. 542.]

Orffyreus' Wheel.—Gravesend, in his Œuvres Philosophiques, published some time about 1774, at Amsterdam, gives an account of a singular machine constructed by one Orffyreus, which was styled a perpetual motion. The facts in relation to it, as nearly as we can ascertain, were simply these: A large circular wheel, twelve feet in diameter, and fourteen inches thick, was made of very light thin deal boards, resembling a drum, as mechanics call it, for carrying bands. The sides, or rather ends, were covered with waxed cloth, to prevent any one from discovering the inside. Through the centre was an iron axle, the gudgeons of which rested on two upright pillars, in the manner of hanging a grindstone. On giving it a slight motion either way, its revolutions speedily increased to twenty-five a minute. For two months it never varied in the least from that motion. Being placed in a chamber, at the residence of the landgrave of Hesse, the door was fastened, and the seal of his highness placed on the lock. At the expiration of sixty days the apartment was opened, and the wheel found revolving at the usual speed. It was then stopped to prevent it from being worn out. The inventor was so incensed because Professor Gravesend undertook to examine it, that he broke it in pieces before his face. The landgrave once saw the inside, but, being sworn to secrecy, only said it was very simple. Both the inventor and his friend died soon after, and all knowledge of its constructionr is therefore lost to the world.—[Scientific Tracts.]

Sea Sledge.—Mr. Buder, Counsellor of Mines at Munich, in Bavaria, some years ago invented what he termed an aquatic sledge, constructed on such a principle that it might be impelled and guided on the water by the rider himself, without any other aid. The first public experiment was made with this machine on the 29th of August, before the royal family, at Nymphenburg, with complete success. It is described as consisting of two hollow canoes or pontoons, eight feet long, made of sheet copper, closed on all sides, joined to each other in a parallel direction at the distance of six feet by a light wooden frame. Thus joined, they support a seat resembling an arm chair, in which the rider is seated, and impels and steers the sledge by treading two large pedals before him; each of these pedals is connected with a paddle fixed perpendicularly in the interval between the two pontoons; in front of the seat stands a small table, on which he may read, write, draw, or eat and drink. His hands being at perfect liberty, he may even play an instrument, load and fire a gun, or do whatever he pleases. Behind the seat is a leather bag, to hold any thing he may want in his excursion. It is evident that this machine must be admirably calculated for taking sketches of aquatic scenery, as also for the diversion of shooting water fowls, in which case the sportsman conceals himself behind a slight screen of branches, or rushes, so as to approach the birds unperceived. The vehicle is far safer than a common boat, the centre of gravity being constantly in the middle of a very broad base, a circumstance which renders upsetting, even in the heaviest gale, absolutely impossible. It is, moreover, so constructed that it may be taken to pieces in a few minutes, packed in a box, and put together in a very short time."—[Court Journal.]

Phrenology, continued—Mimicry, or External Manifestation of the Action of the Organs.

[The figures 1, 2, 3, and so on, have reference to corresponding figures at page 321, vol. ii. of this Magazine.]

1. When the organ acts with a certain degree of force, the head and body are strongly drawn back, the whole erectile system, together with the attitudes and movements, announce the species of delirium with which the individual is attacked.

2. The mimicry of this organ is more calm than that of the preceding. It generally consists, in particular cases, in tender caresses and acts of kindness.

3. When this organ acts strongly, the head and the body are slightly inclined to one side and backwards. The ancients appear to have observed this, and to have represented it in the beautiful group of Castor and Pollux, which may be regarded as the perfect expression of the most tender friendship.

4. In the action of this organ the body is drawn up, the legs a little apart, the arms drawn back, the fists shut, and the eyes threatening. The poltroon, on the contrary, scratches the ear as if to excite the organ.

5. The mimicry of this organ has much analogy with the preceding; the whole body has an extreme tension, in accordance with the feelings of the individual. All the motions are violent, and the sparkling eyes watch the victim.

6. The movements of the cunning man bear the impress of mystery; he moves with stealthy steps, looking around him with caution, and already pointing out with one of his fingers the intended victim of his cunning. The cat in her sports, and animals who watch their prey, are examples.

7. It is particularly in the avaricious man that we recognize the gesture of this instinct. The head is generally inclined forward, the arms tense, and the hand open, as it were to receive, and sometimes half shut, as if to retain what he gives.

8. The gesture of pride is unequivocal—no one mistakes it. Man, under the influence of this sentiment, carries the head high, with the arms sometimes advanced, in an attitude to command, sometimes raised, as well as the eyes, as if to announce self-sufficiency and a contempt for others.

9. The vain man directs his eyes from side to side, to see whether his walk and the elegance of his habits are observed. He cuts the air with his gestures, and balances himself with an air; but this gesticulation is still more prominent in the coquet.

10. Circumspection generally appears more developed in females than in the other sex, and in weak and timid animals more than in those which are courageous. The anxious individual turns the head from side to side, and insures his safety by a thousand precautions.

11. The gesture of this organ is but little perceptible. It resides principally in a certain tension of the head, and in a particular aptitude to scrutinize objects which present themselves to our observation, and afterwards to meditate on their effects.

12. The man who seeks his path generally carries the index finger before his eye, the point resting on the organ. The situation of places is indicated by movements of the arms and hands.

13. When one tries to remember a name that escapes him, his eyes are fixed and raised, a certain tension is felt in the region of the organ, and generally the hand is carried to the eyebrow; it presses and scratches the interior part of the forehead, as if to stimulate the organ.

14. The gesture of this organ is little marked; rather it is calm like that of most of the intellectual faculties. Yet in the orator, who speaks extemporaneously, or who searches for words which escape him, this organ is observed to become a centre of efforts.

15. The mimicry of the latter kind of memory, as well as that of the preceding, is essentially internal, and resides in a certain immobility of different parts of the body, and a strong tension of the organ.

16. The mimicry of this organ appears to be entirely referable to admiration. It is this sentiment, in fact, which predominates on the view of a smiling valley, a picturesque and romantic situation, a picture which presents rich and glowing colors, or a splendidly decorated apartment.

17. The mimicry of this organ has relation to measure and cadence. By it the skilful general hastens or retards the march of his warriors, and by heroic songs excites them to carnage. In the same manner the priest, by sacred hymns, inspires the soul with hope or terror.

18. In the action of this faculty, to which M. Gall likewise refers that of time, or the faculty of remembering epochs and dates, all others are, as it were, absorbed by the present object, and the individual becomes to a certain degree a stranger to what passes around him.

19. The mimicry of this organ is as much in the reflection as in the attitudes and the movements. To form an idea of it, we must behold a sculptor examining his work,

a fashionable milliner showing a hat, and endeavoring to give it the air required by the taste of the day.

20. Attention is the principal attribute of this organ, which, besides, varies according to the degree of meditation which it produces. The arms are often fixed across the chest, and the eyes fixed upon the object of attention, and the frontal region more or less tense.

21. Like that of all the intellectual faculties, the mimicry of this organ is calm and silent. It consists essentially in an immobility, almost complete, of the trunk and the limbs, which is succeeded by a movement of the eyes towards the heavens.

22. The mimicry of this organ consists particularly in counterfeiting the gestures and attitudes of others, with a manifest intention of mocking them. It appears to be the proper corrective of our faults, and of our ridiculous self-love and vanity.

23. Independently of the immobility of the body, and the tension of the head, a respiration, as it were suspended, announces the intellectual efforts necessary to seize the vast chain which connects together all the phenomena of the universe.

24. If we observe the poet who composes, we behold him in his ecstacy at one time raise the head obliquely towards the heavens, as it were to invoke its influence; at another time, place his hand upon the organ, as if to excite its action.

25. It cannot be denied that acts of atrocious perfidy are perpetrated; nevertheless, the contrary dispositions are more common to the multitude. Under ordinary circumstances, man is naturally good, and the mimicry of benevolence is one of the manifestations of a happy people.

26. We must take care not to confound pantomime with mimicry; the latter consists in a natural expression of our sentiments and faculties by gestures and different attitudes of the body. Pantomime, on the contrary, is the imitation of the gestures and attitudes of others.

27. In the action of this organ, the mimicry varies with the subject of the vision. If the object is sacred, the person presents on his visage an impress of unction and superhuman inspiration. If the vision relates to horrid crimes, the face has then the aspect of terror.

28. As the organ of theosophy is at the same time that of veneration, its mimicry varies according to circumstances. In devotion, all the parts of the body are directed towards the heavens; in veneration, on the contrary, they are bent towards the earth.

29. If we remark the man who makes a firm resolution to prosecute an undertaking in defiance of every thing, and without permitting any obstacle to obstruct him, we instantly observe him to raise his whole body, and to advance as if he already wished to brave all obstacles.

Depth of the Ocean.—One mile and sixty-six feet is the lowest depth to which the ocean has been sounded. Where the coast is rugged and high, the water is deep. All the surface covered by seas is three times greater than the dry land, being 148 millions of miles. If the medium depth of the sea be reckoned at two miles, there must consequently be 296 millions of cubical miles of water. The quantity, therefore, is sufficient to cover all the known dry land on the globe to the height of *eight thousand feet;* and further, were all this mass of water thrown into the shape of a ball, it would be *eight hundred miles* in diameter. Philosophers of enlarged views generally believe that the present beds of all oceans were at a former period the habitable parts of the earth. There is no other mode of explaining the presence of such immense masses of marine productions, quite in the interior of all the continents, as are continually brought to light, than by supposing they were once covered by the sea.—[Scientific Tracts.]

American Mammoth.—Professor Silliman, of Yale College, has recently delivered a course of lectures on geology at Hartford. In the course of one of them he exhibited to his audience one of the joints of the back bone of a huge Mastodon, or American Mammoth, recently discovered in excavating a race-way in the western part of Berlin. The Connecticut Courant states, that "the bone was in fine preservation, the principal change being in the color. It was probably one of the joints near the loins, where the back bone (from this specimen) must have been about 18 inches in circumference. This joint has a bone rising from the top of the vertebral column, about 14 inches, and sloping backward at an angle of 25 or 30 degrees. From the perfect condition of the bone thus accidentally discovered, there is reason to believe that a complete skeleton may be recovered by a persevering and diligent search in the morass where the specimen in question was found. Such a skeleton would be a noble memorial of the vast animals which once roamed through New-England."

Animal Mechanics, or Proofs of Design in the Animal Frame. Part II., showing the Application of the Living Forces. [From the Library of Useful Knowledge.]

(Continued from vol. iii. page 343.)

The valves have no power of accelerating the motion of the blood; they only prevent its retrograde motion, and cause the whole power of the heart to be employed in directing the blood forwards in the course of the circulation. But when they are ruptured, when the valve first described is rent, or the cordæ tendineæ are broken, then the membrane, which we have said is like a sail, is carried back from the second into the first cavity. It is like the sail torn from the sheets and flying out before the wind: the effect is terrible: the pulse of the heart, the whole force of which should be given to carry the blood forwards in the arteries, has half its force directed backwards upon the veins.

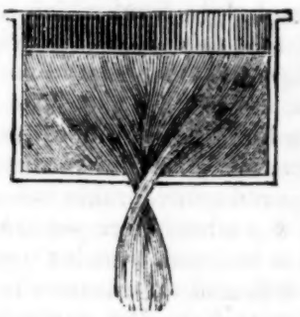
In the same manner the semi-lunar valves in the root of the aorta may have their margins torn. We have described the margin of these valves to be strenghtened by a tendon or cord run along their edge, like the rope which is sewed to the edge of a sail. There is an obvious intention in strengthening the valve here, but when textures of this kind become impaired in the human frame, this may give way and be torn, and then the re-action of the artery, when the heart has given its stroke, is lost; for, instead of impelling the blood forwards, the blood runs backwards into the heart. The effect of these accidents is extreme debility of circulation, with symptoms varied according as the defect falls on the circulation through the lungs, or through the body—that is, whether on the right or the left heart of man. But such accidents are rare, and never take place until disease has impaired the strength of what we may call the tackle of the valve.

The next remark is founded more directly on the hydraulic principle.

This ring and these valves, at the beginning of the great artery, imply a certain constriction or diminution of the tube at this part, and we have now to show that such a contraction of the tube at this precise part does not diminish the diameter of the column of blood. This appears an inconsistency; but if a stream of water flow from a cistern, through a hole in that cistern, the column of water will be diminished at a certain point of its exit.

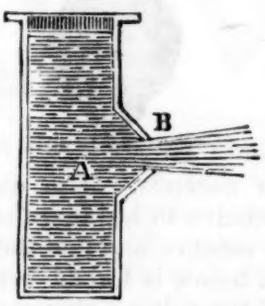
The water flowing through the bottom of the cistern may be represented by converging lines; and their united forces impelling the stream forward, contract it just beyond the exit—the *Vena Contracta.* Nature, taking advantage of this law, has constructed the narrow ring which we have shown is necessary to the accurate adjustment of the valve, at the precise part where the blood, issuing from the cavity of the ventricle, is necessarily contracted to the smallest space. The column of blood would be contracted at this point, even if there were no coats of the artery to confine it there.

Fig. 9.



We had thought of this as a thing indicated by reasoning, but we find that an appropriate experiment has been made which proves it.

Fig. 10.



A being the side of a reservoir, and B a short tube giving issue to the water, it will deliver as much water by this conical constructed mouth as if the tube were of equal diameter with the hole in the reservoir. The reader will perceive how satisfactorily this indicates what is designed by the difference in the size of the mouth of the ventricle which gives entrance, and that which gives issue to the blood.

With a view to explain the motion of fluids in tubes, and finally the motion of the blood in the blood-vessels, let us consider what takes place in the motion of the column of water which is not contained in a tube.

When water is poured out, and descends in an uninterrupted stream, the column contracts as it descends, until it has acquired such a velocity that the atmosphere opposes it and scatters it; we do not mean the contraction illustrated by fig. 9, but that gradu-

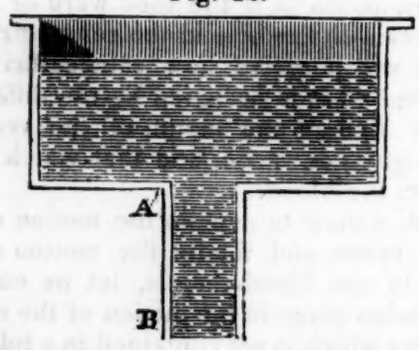
al diminution of the diameter of the stream, owing to the height from which it falls. We apprehend that this is on the principle that falling bodies are accelerated as the square root of the height from which they fall. The stream being more rapid at its lower part, is necessarily smaller in diameter, until having acquired considerable velocity the resistance of the atmosphere separates its filaments, and it becomes broader again.

A very different appearance is presented in a jet d'eau; here the ascending stream

Fig. 11.

widens as it ascends. The explanation of this we conceive to be, that the fluid is retarded as it mounts, and that the stream propelled from below is forced between the filaments* of the column above, and disperses them, so as to give the column a conical form.

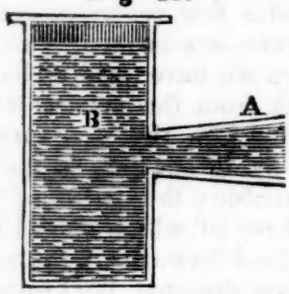
Fig. 12.



This reservoir will be emptied more rapidly, if, instead of a hole in the bottom at A, the water be discharged by a tube, A B, of the diameter of the hole. Here the column of water being perpendicular, it will be accelerated at its lower part; but instead of diminishing its diameter, as it would do if not confined by a tube, it will draw an additional volume of water down, and accelerate the discharge.

It will be very different if the force be altogether from behind, as when water is propelled into a horizontal tube.

Fig. 13.



The tube A being conical, will discharge more fluid from the reservoir B than if it had been of equal length, and its diameter throughout the same as at its commencement. Because, as it appears to us, the weight of the descending column being the force, and this operating as a *vis a tergo*, it is like the water propelled from the jet d'eau, and the gradual expansion of the tube permits the steam from behind to force itself between the filaments, and disperses them, without producing that pressure on the sides of the tube which must take place where it is of uniform calibre. These principles will give great interest to the following fact.

The celebrated John Hunter took great pains to prove that the artery had its diameter enlarged as it proceeded from the heart, and that the areas of the branches of an ar-

Fig. 14.

* Those who treat of hydraulics divide a column of water into ideal lesser columns, which they call filaments, with a very different meaning from the fibres of the anatomists.

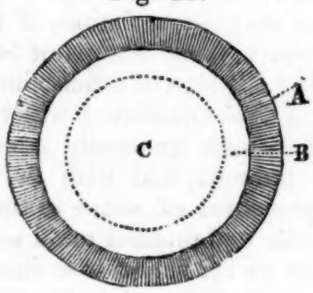
tery were greater than the diameter of the parent trunk.

That is to say, the section of the trunk, at A, was not so great as the two sections, at B, taken together; that the two sections at B taken together were not so great as the four sections at C; that the conjoined diameters, therefore, of the branches of an artery were greater than the diameters of the artery itself. This fact has been sometimes expressed by saying that the artery was a cone with its apex in the heart.

When we stand by a rapid river, we can perceive that the surface of it is not level. The stream is rapid in the middle, and there the water is highest. The friction of the water against the bottom and the sides retards the stream, whilst the greater velocity of the current in the centre draws the water to it, which is the reason of its elevation there.

For the same reason, if an engineer estimate the quantity of fluid to be delivered through a tube without estimating the friction of the sides, he will be disappointed in the result of his calculation; for as the water of the river is delayed by the bottom and sides, so is the fluid in the tube retarded by the attraction or friction between the water and the tube. And if we can imagine a section representing the tube and the flowing

Fig. 15.

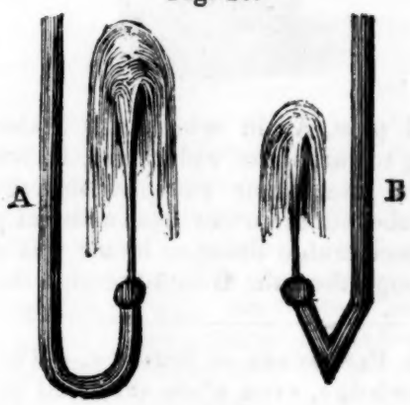


water, A will be the solid tube, B the water retarded or arrested by the friction against the tube, and the space C, within the inner circle, would represent that part of the stream which is in uninterrupted flow. The engineer will, therefore, lay a tube larger than would be necessary, were there neither attraction nor friction between the solid and fluid. It must further appear that the smaller the calibre of the tube, the surface of attraction or friction will be proportionally greater. Does not this explain the anatomical fact which we have been contemplating, that the area of the smaller branches is comparatively larger than the trunk from which they are derived?

Two beneficial effects result from this: for we must observe that the blood-vessels of the body are reservoirs as well as conduit pipes. A man of middling stature has 33 lbs. of blood in his circulating vessels; if the vessels did not enlarge as they receded from the heart, there would be no place for the deposite of this great quantity of blood. The advantages, then, of this particular form, are, *first*, that a quantity of blood necessary to the economy is contained within the vessels; and, *secondly*, that the blood is more easily urged forwards by the action of the heart. The reader will not now be surprised in learning, that a pipe of a conical form, that is, enlarging as it proceeds, gives the least interruption to the flow of water from a reservoir.

Water flowing in a tube will be retarded by any sudden angle in the tube. If the ad-

Fig. 16.



jutage of a jet d'eau have not a gentle and uniform sweep where it is turned, the jet of water will not reach the height which it ought to do by calculation of the height of the reservoir of water from which it descends: it will go higher from the tube A than from B. This circumstance explains the uniform and parabolic curve which the great artery of the body takes in first ascending from the heart. It explains also why the branches of the great artery go off at different angles, according to their distance from the heart, or, in other words, why they pass off at smaller angles with the stream the farther the artery recedes from the heart.

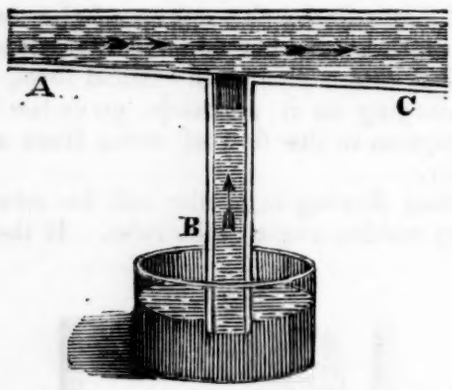
In the distribution of water pipes, it is very necessary to attend to the angle at which the small pipe is attached to the greater one, not only because a pipe being bent abruptly causes loss of motion from the impulse of the fluid against the side, but also from another well known law of hydraulics.

If a pipe be fixed into another so as to join it at an angle contrary to the direction of the stream, the discharge into that lateral branch from the larger tube will not only be much smaller than we might estimate by the

diameters of the tubes, but, in certain circumstances, it will discharge nothing at all; nay, on the contrary, the water would be drawn from the lesser tube into the greater, until the lesser tube be emptied, and air be sucked in.

Bernouilli found that when a small tube, B, was inserted into the side of a horizontal

Fig. 17.



conical pipe, A, in which the water was flowing towards the wider end, C, not only none of the water escaped through the small tube, but the water from a vessel placed at a considerable distance below was drawn up through the tube B into the pipe A.

The Pleasures of Science.—The man of knowledge, even when shrouded in darkness and in solitude, where other minds could find no enjoyment, can entertain himself with the most sublime contemplations. He can trace the huge globe on which we stand flying through the depths of space, carrying along with it its vast population, at the rate of sixty thousand miles every hour, and by the inclination of its axis, bringing about the alternate succession of summer and winter, spring and harvest. By the aid of his telescope he can transport himself towards the moon, and survey the circular plains, the deep caverns, the conical hills, the lofty peaks, the shadows of the hills and vales, and the rugged and romantic mountain scenery which diversify the surface of this orb of night. By the help of the same instrument, he can range through the planetary system, wing his way through the regions of space, along with the swiftest orbs, and trace many of the physical aspects and revolutions which have a relation to distant worlds. He can transport himself to the planet Saturn, and behold a stupendous ring, 600,000 miles in circumference, revolving in majestic grandeur every 10 hours around a globe 900 times larger than the earth, while seven moons, larger than ours, along with an innumerable host of stars, display their radiance to adorn the firmament of that magnificent world. He can wing his flight to the still more distant regions of the universe, leaving the sun and all his planets behind him, till they appear like a scarcely discernible speck in creation, and contemplate thousands and millions of stars and starry systems, beyond the range of the unassisted eye, and wander among suns and worlds, dispersed throughout the boundless dimensions of space. He can fill up, in his imagination, those blanks which astronomy has never directly explored, and conceive thousands of systems and ten thousands of worlds, beyond all that is visible by the optic tube, stretching out to infinity on every hand—new creations incessantly starting into existence—peopled with intelligences of various orders, and all under the superintendence and government of the "King Eternal, Immortal, and Invisible," whose power is omnipotent, and the limits of his dominions past finding out.

It is evident that a mind capable of such excursions and contemplations as I have now supposed must experience enjoyments infinitely superior to those of the individual whose soul is enveloped in intellectual darkness. If substantial happiness is chiefly seated in the mind, if it consists in the vigorous exercise of its faculties, if it depends on the multiplicity of objects which lie within the range of its contemplation, if it is augmented by the view of scenes of beauty and sublimity, and displays of infinite intelligence and power, if it is connected with tranquillity of mind, which generally accompanies intellectual pursuits, and with the subjugation of the pleasures of sense to the dictates of reason—the enlightened mind must enjoy gratifications as far superior to those of the ignorant, as man is superior in station and capacity to the worms of the dust.—[Dr. Dick.]

The Christian Religion.—If we would learn the value of this to the world, let us travel in countries where the Bible is not known, and contrast their situation with our own. Go then into a heathen country, no matter in what direction, or at what age of the world, and you will find,—

No equality between the sexes. Man is stronger than the woman, and therefore he has made her his slave, the minister of his pleasure. Companionship between husband and wife is unknown, and the connection dissolved at the interest or caprice of the former.

You will find but little parental or filial

affection. The mother neglects or exposes, or actually destroys her own child; the child grows up to beat its mother or father, to neglect them in their old age, and finally leaves them to perish, untended and unmourned.

You will find no such thing as honesty, or truth, or rarely, indeed, in their dealings with one another. Supreme selfishness, without the least regard to others, regulates the conduct of every individual. Legal justice is a thing unknown—mercy an attribute seldom exercised. You will find none of those institutions, which, in Christendom, adorn human nature, and which serve to alleviate so many of its woes. When you have travelled beyond the influence of the Bible, you will find no "Foundling Hospital," no "Lunatic Asylum," no "House of Refuge;" you will look in vain for the "Orphan's House," the "Sailors' Snug Harbor," or a "Retreat," for the blind, the deaf, or the poor. Institutions like these are never found except by the side of temples erected to the God of the Bible.

What shall we say, then, to those men, who, incendiary-like, are seeking to destroy the influence of the Christian religion, and who would fain persuade us to burn up our Bibles, and pull down our churches? What else shall we call them than enemies of themselves and their kind? What would these men have? Even were there no hereafter—even though existence terminated at death—though the bible were a lie, or a fable, this life a dream and the next a fancied vision—we say, even though the enemies of the Bible were capable of proving all this to a demonstration, what would be gained to the human race by doing so?

These are questions which the infidels and free-thinkers of the age dare not ask themselves; or if any ask, they dare not answer them, for then would they stand self-convicted of conspiring against the good order, the peace and happiness of society. Deluded men! why seek to accomplish what, at best, would only tend to embitter the short-lived joys of earth; but which, if you would listen to the voice of reason and conscience, they would tell you, would send man hopeless to his grave, and beyond that shut him up in the prison of despair.

Subjects of Inquiry.—The following, among others, are still subjects of speculation and controversy: What is national wealth? the means of producing it? the influence or action of the generating causes? their immediate or distant effects? their apparent or actual results? the different ramifications of the sources of wealth, such as labor, capital, the circulation of commodities or commerce? and the revenue or consumption? the source of wealth, whether in labor, foreign commerce, land, or capital stock? in what capital consists? the nature of money? the proportion which the circulating money of a country bears to the whole value of the annual produce circulated by it? Whether labor is the standard of value, and whether there is an immutable standard measure of value? whether agricultural labor is exclusively productive, or most productive? and perhaps the most controverted subject of political economy is, whether the home or foreign commerce is most productive of national wealth?—[Scientific Tracts.]

Camphor in India.—In the bazaars in the East Indies, camphor is always exposed for sale in the open air, surrounded by a few pepper-corns, *which prevent the evaporation of the camphor.* Our correspondent, "Bergem," to whom we are indebted for this fact, and for so many other valuable communications on Indian arts and manufactures, habits, and customs, &c. asks, "What is the chemical principle on which this remarkable effect depends?" We shall be happy to receive from some of our chemical correspondents a satisfactory answer to the inquiry. The principles of affinity and repulsion, which determine the peculiar properties of different colors, have hitherto received but little attention, though there are few subjects more calculated to awaken curiosity or reward investigation.

Cause of Fevers.—Hudson, the discoverer and first navigator of Hudson's river, on the 6th of September, sent a boat to sound the Kills between Bergen and Staten Island, and his men, on their return, reported that the "lands were as pleasant with grass and flowers, and goodly trees, as ever they had seen, and very sweet smells came from them." This is not now the case. The grazing of cattle, the rooting of swine, the plough, and other implements of agriculture, have entirely destroyed a great number of the annual grasses and plants which formerly flourished in this country. Several persons told Kalm, so far back as 1748, that the loss of many odoriferous plants, with which the woods were filled before the arrival of the Europeans, but which the cattle have now extirpated, might be looked upon as a cause of the greater progress of the fever; for the greater number of those strong plants occasioned a pleasant scent to rise in the woods every morning and evening. The ve-

getable kingdom of our western country is uncommonly rich, and luxuriantly abundant, because cultivation has been but partially extended to it. Hogs have produced great destruction among all tuberous and bulbous roots. Even the laurel tree of Carolina has become almost extinct in many parts of the country, owing to the depredations of domesticated animals.—[Scientific Tracts.]

Mixed Blood of Americans.—"It is acknowledged," says Cicero, "that literature, polite arts, religion, agriculture, laws, and social rights, originated in Athens, and were thence distributed over all nations." The fertility of the soil, the excellence of the climate, the freedom of the government, and the enterprising spirit of the people, must have co-operated in producing this transcendant and pre-eminent state of human exaltation. And if a comparison was instituted in those respects between that country and ours, in what important part should we be deficient!

We are perhaps more favored in another point of view. Attica was peopled from Egypt, but we can boast of our descent from a superior stock. I speak not of families or dynasties; I refer to our origin from those nations where civilization, knowledge, and refinement, have erected their empire, and where human nature has attained its greatest perfection. Annihilate Holland, Great Britain, Ireland, France, and Germany, and what would become of civilized man? This country, young as it is, would be the great Atlas remaining to support the dignity of the world: and perhaps our mingled descent from various nations may have a benign influence upon genius. We perceive the improving effects of an analogous state upon vegetables and inferior animals. The extraordinary characters which the United States have produced may be in some measure ascribed to the mixed blood of so many nations flowing in our veins; and it may be confidently predicted, that the operation of causes, acting with irresistible effect, will carry, in this country, all the improveable faculties of human nature to the highest state of perfection.—[Ibid.]

Coal *vs.* Gold.—In a work lately published by a Spaniard, there is a comparison between the produce of the gold and silver mines in America and the coal mines in England, from which it appears that the gross value of the annual produce of the coal mines, which is 18,000,000 tons, amounts to 450,000,000 francs, including the wages and other charges; whilst the produce of the gold and silver mines, including the same charges, is only 320,500,000 francs: showing a balance in favor of the coal mines of England, over the gold and silver mines of the New World, of no less a sum than 227,500,000 francs.

Silk Manufacture and Morus Multicaulis.—About the year 1824, M. Perottet, a distinguished travelling botanist, introduced this valuable plant into France. He procured two specimens at Manilla, the capital of the Phillippine Isles, and carried them to the Isle of Bourbon, and from thence into Cayenne and France. Now there are millions in Europe, Asia, and America, growing from those two plants; and in a few years, there will be additional millions. From an article in the New-England Farmer, by Wm. Kenrick, we extract the following:

The sudden and extraordinary extension of the silk manufactures, both in France and in England, during the last ten years, has been mainly ascribed to the machine invented in France by M. Jacquard; and the powerful impulse thus given has been assigned to the *Jacquard Loom*. This loom is stated to perform all those labors which had heretofore been exclusively confined to the most skilful hands, with important economy of time and labor in the preliminary steps, and is so decidedly superior to all other looms, for all the curious varieties of figure-silk weaving, that it has superseded them all, both throughout France and England.

Those resources, the millions we now annually expend for silks, the productions of foreign industry, and of foreign policy, draining our country of its treasures — those vast sums should be preserved to our citizens. This industry and resource of wealth must not be compromised nor bartered, nor sacrificed to rival and particular interests, or to the interests of rival nations. The cultivation of silk being in no wise exclusive, but a great and general interest, alike adapted to every region of our country, from the north to the extreme scuth; from the Atlantic to our territories which are bounded on the Pacific ocean—it demands that equal share of protection which has been bestowed on cotton, on iron, on tobacco, and on the productions of the sugar cane. But the encouragement of the cultivation of the mulberry, and of the growth of silk, *in the United States, as a resource of Agriculture*, seems not to have formed any part whatever of what is called the "American System."

The enterprise, the fertile invention, the noble efforts of individual exertion, have already accomplished much, but the field is very broad and of vast extent; much yet remains to be done. That industry which still slumbers: that portion, which unawakened is now lost, being alone more than sufficient to accomplish all, if once aroused and rightly directed—more than sufficient to recover again those very con-

siderable sums, the millions so prodigally expended, with interest an hundred fold.

By those unceasing toils and mighty efforts, and matchless labors, for which our people are so distinguished, the millions thus recovered will not only be their just reward, but will add to the substantial wealth of the nation, and to the glory of the whole Republic. * * *

In our own country, there may yet perhaps be some who would advance the question whether this most desirable plant will endure the winters of northern climates. At New-York, on Long Island, this mulberry has sustained, unprotected, the rigors of seven winters, as I am informed, and the extraordinary winter of 1831–2, which destroyed so many trees hitherto deemed hardy even to the root.

I have indeed sanguine expectations, that the *Morus Multicaulis* may prove as hardy in our climate as the peach tree, which was originally from Persia, or the cherry tree, when once their roots have become established. Its vegetation being rapid and luxuriant, and prolonged to a later period in autumn than that of most other trees, or till the tender and yet vegetating tips of the twigs are checked by the frost, these extreme ends will generally be lost, as they always are of the common White Mulberry when young.

In our climate, there are many kinds of trees which need protection during the first winter, though they may never require any afterwards. Such are the young seedling plants of but a single summer's growth, of the *Cherry*, *Plum*, *Pear*, the *Quince*, and the *White Mulberry*, &c. all which require to be carefully, compactly placed in cellars; during winter, their roots buried in soil; or occasionally, for protection, may be laid in out of doors compactly and in a slanting position, their bodies being in part protected by soil. For all these species are liable to be killed occasionally to the root by the first winter, or to be utterly destroyed by being thrown out by frost, yet in the second winter it is far otherwise; their roots becoming strong and firmly established, the well ripened wood of the second year, and the wood of two years' growth becomes indestructible by any but very extraordinary winters. I have taken the same precautionary measures with the young and tender plants of this mulberry, so valuable—the layers of but a single summer's growth, which are separated in autumn.

I will offer some further evidence of the hardihood of this plant. But the experiments which are now in progress elsewhere, as well as here, on a more extensive scale, will, as I trust, soon enable us to put this subject more fully at rest.

Very late in the spring of 1833, more than an hundred young trees of the Morus Multicaulis were set out on the place of S. V. S. Wilder, Esq. in Bolton, Worcester county. The soil springy, the exposition cold, and sloping to the north; Mr. Joseph Breck, a distinguished botanist of Lancaster, the town adjoining, having especial charge of these plants, has lately very critically examined them. Thus unfavorably situated, and unprotected, they have borne the last winter without injury, except only the very tips of the twigs. Mr. Breck is persuaded that they are even hardier than the common white mulberry, since some hundred of the latter, which stood very near, were killed half way down to the ground by this same winter.

I have just received a letter, of the 30th ult., from John Gordon, Esq. a public spirited gentleman, who has, during the last year, made trial of the *Morus Multicaulis*, at Hampstead, N. H. These plants grew well during the summer and have borne well the winter, and are now luxuriantly vegetating to within two or three inches of the tips. Mr. Gordon is now making trial of the white mulberry, and the *Morus Multicaulis*, in the city of Portland, in exposed situations, also of the silk worm, confident they will all succeed well, and that the culture of silk will answer well in that climate.

Although the mulberry flourishes most luxuriantly in a moist and rich soil, and protected situation, yet the leaves in such soils and situations are more crude, and not of a quality so nourishing. Besides, the growth of the tree in such situations being much more rapid, the wood is consequently more tender and more liable in northern climates to be killed by winter; and authors seem to be agreed, that the proper soils for the mulberry tree are dry sandy, or stony; and trees on dry light soils, and situated on the open plains, and on hills the most exposed to cold winds, will generally be found to suffer least of all from the effects of winter. Such appears to have been the case in 1831–2; the ravages of that destructive winter seem to have been generally confined to trees growing in particular situations and soils. Even delicate trees and plants, the natives of more southern climes, become more hardy, and capable of supporting the northern winters, by being planted on the north side of buildings and fences, and in their shade. The exposure to the most intense degree of cold, in such situations, is more than compensated by the protection which is thus afforded to the plants during winter, from the pernicious and far more destructive rays of the sun.

The prediction, in 1830, of the late Dr. Felix Pascalis, that, "after the discovery of *this plant*, a doubt no longer exists that two crops of silk may be produced in a single season;" this prediction has since been fulfilled—its truth confirmed by experiment—the soil and cultivation, the habitations for the successive generations of insects being yet the same: all thus converted to a double use, and the whole production doubled. It must be obvious, that the actual profit thus augmented must be manifold.

Newton, June 7th, 1834.

To remove a Hard Coating or Crust from Glass and Porcelain Vessels. — It often happens that glass vessels, used as pots for flowers and other purposes, receive an unsightly deposit or crust, hard to be removed by scouring or rubbing. The best method to take it off is to wash it with a little diluted muriatic acid. This acts upon it and loosens it very speedily.

ASTOR'S HOTEL.—The corner stone of this fine building was laid on the 4th of July at 6 o'clock A. M., in the presence of about a hundred spectators. A box was deposited beneath the stone, with a silver tablet in it, containing the following inscription :

CORNER STONE OF THE PARK HOTEL.
Laid the 4th of July, 1834.
The Hotel to be erected by John Jacob Astor.
BUILDERS,
Philetus H. Woodruff, Peter Storms, Campbell & Adams.
SUPERINTENDENTS,
Isaiah Rogers and *Wm. W. Barwick.*
ARCHITECT,
Isaiah Rogers.

The daily papers of Thursday, the last number of the Mechanics' Magazine, containing a full length portrait of Lafayette, and "Goodrich's Picture of New-York," were also deposited in the box.

The dimensions of the building are as follows: The length of the building, fronting Broadway, will be 201 feet 1 inch; fronting Barclay street, 154 feet; fronting Vesey street, 146 feet 6 inches. There are to be six stories: the height to the top of the cornice will be 77 feet. In the centre there will be a court yard, measuring 105 feet by 76. Each of the fronts will be built of *blue Quincy granite.* As the principal entrance will be from Broadway, there will be four columns—two of the Doric, and two of Antæ—surmounted with entablature.

Questions on Mathematics—Reply to Mr. Caryl, of Buffalo. To the Editor of the Mechanics' Magazine.

SIR,—Want of time has prevented me hitherto from noticing a communication from Mr. L. W. Caryl, of Buffalo, which appeared in the New-York American last July. There was a faint attempt towards a solution of the questions proposed him by me; the answers to the previous questions were wrong, and I pointed out to him the errors; still they were disregarded, and nought but a bag of wind substituted in place of solutions. In return for which, I propose to send him on the solution to the questions proposed, if not done within the specified time, and stand ready to solve any question proposed by the gentleman, and send the solution by the return mail. As he complained of a want of fair play in the New-York papers, he may name any paper in Buffalo, for the purpose of inserting the questions or solutions. JNO. D. WILLIAMS.

SCIENCE AMONG THE ARABS.—It is unquestionable that a great number of the inventions which at the present day add to the comforts of life, and without which literature and the arts could never have flourished, are due to the Arabs. They taught us the use of the pendulum in the measurement of time; and also of the telegraph, though not with all the speed and effect of modern improvement. The manufacture of silk and cotton was brought by them into Spain, as was probably the art of dying black with indigo. They introduced the use of camels and carrier pigeons into Sicily. The art of enamelling steel, the system of a national police, the principles of taxation, and the benefits of public libraries, were all derived from the same source. To them also belongs the honor of making us acquainted with the manufacture and use of paper. This invaluable commodity, it is true, had from a very remote period been made in China from the refuse of silk, bamboo, and other substances. About the year 649 the invention was introduced at Samarcand by the Tartars, who used cotton instead of silk; and when that flourishing city was subdued by the Moslems, the process was conveyed to Mecca, by Yussuf Amru (A. D. 706), where paper was made similar to that now manufactured, though it does not appear to have come immediately into general use. From Mecca the art spread through all the Arabian dominions. In Spain, which was renowned for this article from the 12th century downwards, flax, which grew there abundantly, was substituted for cotton, the latter being scarce and dear. Alphonso X. established paper-mills, and his example passed successively into France, Germany, and England. Gunpowder, the discovery of which is generally attributed to Schwartz, a German chemist, was known to the Arabs at least a century before any traces of it appear in European history. Though it is probable they may have derived their knowledge of this composition from the Indians, they certainly improved its preparation, and found out different ways of employing it in war. The mariner's compass has been alternately given to the Italians and the French; but Tiraboschi, notwithstanding his partiality for his country, is decidedly of opinion that the honor of its invention is due to the Arabs. Its adoption in Europe is not older than the 13th century, while among the Arabs it was known in the eleventh. The polarity of the magnet is alleged to have been known to Aristotle; and something like the compass was in use among the Chinese; but as the Saracens paid considerable attention to navigation, and often undertook long and laborious voyages, history has with much probability assigned to them the discovery of the magnetic needle.

THE *Mechanics' Magazine and Register of Inventions and Improvements* is published by the Proprietors, D. K. MINOR and J. E. CHALLIS, at No. 35 Wall street, New-York: in *weekly* sheets of 16 pages, at 6¼ cents—in monthly parts of 64 pages, at 31¼ cents—in volumes of 384 pages, in cloth boards, at $1.75—or at $3 per annum, *in advance.*—JOHN KNIGHT, (formerly proprietor of the London Mechanics' Magazine,) Editor.